Lukas Heumos

Curriculum Vitae

Education

2021-2024 **Dr. rer. nat.**, *Helmholtz Center for Environmental Health, Institute for Computational Biology, Technical University*, Munich.
Prof. Dr. Fabian Theis, Dr. Herbert Schiller

2018–2020 **Master of Science Bioinformatics**, *Eberhard Karls Universität Tübingen*, Tübingen, 1.37.
Dr. Sven Nahnsen, Prof. Dr. Philipp Hennig

2015–2018 **Bachelor of Science Bioinformatics**, *Eberhard Karls Universität Tübingen*, Tübingen, *1.79*.
Prof. Dr. Oliver Kohlbacher

Doctorate Research

Supervisors Prof. Dr. Fabian Theis (Director Institute of Computational Biology, Associate Faculty at the Wellcome Trust Sanger Institute in Hinxton, Technical University of Munich), Dr. Herbert Schiller (Comprehensive Pneumology Center)

Description Member of the Human Cell Atlas consortium. Investigation of cell-cell communication and the regulation of gene programs in health and disease focusing on the lung. Development of machine learning based single cell analysis methods.

Experience

Vocational

11.2020–12.2020 **Intern**, Boehringer Ingelheim, Biberach an der Riß.
Open-source development on MegaQC and improving internal tooling.

03.2018–09.2020 **Software Developer and Scientific Support**, Quantitative Biology Center (QBiC), Tübingen.
Software development of libraries, tools and portlets. Design and development of a containerized large-scale machine learning infrastructure based on Apache Spark. GUIDE-Seq data analysis.

08.2016–09.2020 **TOEFL Test Administrator and Team Leader**, TOEFL Team Tübingen, Tübingen.
Leading the student based TOEFL Team Tübingen and supervising TOEFL tests.

02.2016–08.2018 **Systems Administrator and Scientific Support**, Paleogenetics Group of Prof. Dr. Dr. Verena Schünemann, Tübingen.
Maintained the computational infrastructure and provided scientific bioinformatics support.

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Activities

09.11.2019–13.11.2020 **Biohackathon Europe**, *virtual*.
Development of a pangenome construction Nextflow pipeline.

01.11.2019–01.11.2020 **iGEM Tübingen Advisor**, *Tübingen*.
Advising the iGEM Team Tübingen, project development, teaching bioinformatics and software engineering.

28.06.2020–01.07.2020 **Lindau Nobel Online Science Days**, *Virtual*.
Talks and discussions with nobel laureates.

19.06.2020–21.06.2020 **Lindau Nobel Sciathon**, *Virtual*.
Examining similarities and differences between the COVID-19 pandemic and climate change.

05.04.2020–11.04.2020 **COVID-19 Virtual Biohackathon**, Online.
SEIR modelling of COVID-19 infections; discriminating feature detection across different SARS-Cov2 sequences; nf-core coordinator for gene expression based global infection analysis.

27.03.2020–30.03.2020 **Hackzurich, ETH Zürich**, Virtual.
Agent-based modelling of COVID-19 infections in Switzerland.

04.03.2020–06.03.2020 **nf-core hackathon**, Francis Crick Institute London.
End-to-end machine learning with Nextflow and proteomics nextflow pipelines.

19.02.2020–21.02.2020 **AI hackathon**, Helmholtz AI Munich.
Machine learning for improved cancer differential diagnosis by multi-level MALDI imaging molecular-morphological data.

01.12.2018–01.11.2019 **iGEM Tübingen team member**, Tübingen.
Team leading, finance (raised more than 20000€), web development, bacterial RNA-Seq data analysis, metabolic modelling and development of a machine learning based cell-penetrating peptide efficacy predictor.

08.04.2019–10.04.2019 **nf-core hackathon**, Tübingen.
Implementation of Nextflow pipelines for label-free proteomics data and GUIDE-Seq data.

01.12.2017–01.11.2018 **iGEM Tübingen team member**, Tübingen.
Homology modelling, molecular dynamics simulations, development of a machine learning based deimmunization workflow.

Teaching

15.04.2020–24.07.2020 **Teaching Assistant for Biomedical Data Management Seminar**, University of Tübingen, Quantitative Biology Center, Tübingen.
Supervising master students in a seminar about commercial clouds in biomedical research.

03.09.2019–06.09.2019 **Bioinformatics and Lab Course**, Experimenta Science Center, Heilbronn.
Introduced DNA, sequencing, CRISPR-Cas9, bioinformatics, project development and management with applied sessions to high school students.

Community Service

Since 2020 Reviewer for the Journal of Open Source Software (JOSS)

Awards and Honors

2020 iGEM gold medal for iGEM Team Tübingen 2020

2020 Awarded 2500€ grant by Promega for iGEM Tübingen

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2020 (postponed to 2021)	Nominated by the University of Tübingen to attend the interdisciplinary 70th Lindau Nobel Laureate Meeting and accepted by the Lindau Meeting Council
2019	Invited by New England Biolabs to meet Nobel Laureate Richard J. Roberts in Ipswich, USA
2019	iGEM bronze medal for iGEM Team Tübingen 2019
2019	Bestowed 'Award for Exceptional Student Commitment' for iGEM Tübingen by the University of Tübingen
2018	iGEM silver medal for iGEM Team Tübingen 2018
2015	9th out of more than 1000 teams in German Founders' Prize for Students competition
2014-2016	Professional Starcraft 2 player (>4000€ in prizes)

Computer skills

Basic	R, BASH
Intermediate	LaTeX, WEB DEVELOPMENT, MACHINE LEARNING, CONTAINER TECHNOLOGIES, C++
Advanced	PYTHON, JAVA, NEXTFLOW, MLFLOW, LINUX

Languages

German	**Mothertongue**
English	**Fluent**
French	**Intermediate**

Talks

11.2020	Deterministic end-to-end machine learning with MLflow and mlf-core, Data & AI Summit Europe 2020 (virtual)
10.2019	On 'GLP.exe' (iGEM Tübingen project 2019) in Boston, USA, at the Giant Jamboree
04.2015	About 'Gloready' (German Founders' Prize for Students project) in Stuttgart and Hamburg at the Landesbank Baden-Württemberg Sparkasse and the grand finals

References

Prof. Dr. Oliver Kohlbacher
Professor of Applied Bioinformatics,
Fellow MPI for Developmental Biology
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Dr. Sven Nahnsen
Director Quantitative Biology Center

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More references are available on request.

Publications

1. Lamsfus-Calle*, A., A. Daniel-Moreno, G. Urena, J. Rottenberger, J. Raju, T. Epting, S. Marciano, **L. Heumos**, P. Baskaran, J. S. Antony, R. Handgretinger, and M. Mezger. "Universal gene correction approaches for β-hemoglobinopathies using CRISPR/Cas9 and AAV6 donor template delivery". In: *Submitted* (2020)

2. Lamsfus-Calle, A., A. Daniel-Moreno, J. S. Antony, T. Epting, **L. Heumos**, P. Baskaran, J. Admard, N. Casadei, N. Latifi, D. M. Siegmund, M. S. D. Kormann, R. Handgretinger, and M. Mezger. "Comparative targeting analysis of KLF1, BCL11A, and HBG1/2 in CD34+ HSPCs by CRISPR/Cas9 for the induction of fetal hemoglobin". In: *Scientific Reports* 10.1 (June 2020), p. 10133. ISSN: 2045-2322. DOI: 10.1038/s41598-020-66309-x. URL: https://doi.org/10.1038/s41598-020-66309-x

3. Ferrarini, M., V. Aguiar-Pulido, E. T. Dawson, A. Guarracino, A. Gruber, **L. Heumos**, A. Kanitz, A. Lal, B. E. Pickett, R. Rebollo, and et al. "Global analysis of human SARS-CoV-2 infection and host-virus interaction". In: *BioHackrXiv* (May 2020). DOI: 10.37044/osf.io/b4zkp. URL: biohackrxiv.org/b4zkp

4. Ballesio, F., A. H. Bangash, D. Barradas-Bautista, J. Barton, A. Guarracino, **L. Heumos**, A. Panoli, M. Pietrosanto, A. Togkousidis, P. Davis, and et al. "Determining a novel feature-space for SARS-CoV-2 sequence data". In: *BioHackrXiv* (May 2020). DOI: 10.37044/osf.io/xt7gw. URL: biohackrxiv.org/xt7gw

5. Bichmann, L., A. Nelde, M. Ghosh, **L. Heumos**, C. Mohr, A. Peltzer, L. Kuchenbecker, T. Sachsenberg, J. S. Walz, S. Stevanović, H.-G. Rammensee, and O. Kohlbacher. "MHCquant: Automated and Reproducible Data Analysis for Immunopeptidomics". In: *Journal of Proteome Research* 18.11 (2019). PMID: 31589052, pp. 3876–3884. DOI: 10.1021/acs.jproteome.9b00313. eprint: https://doi.org/10.1021/acs.jproteome.9b00313. URL: https://doi.org/10.1021/acs.jproteome.9b00313

6. Widerspick, L., **L. Heumos**, B. Nowack, and A. Abbasi. "Junge Molekularbiologie-Teams kreieren faszinierende Innovationen". In: *BIOspektrum* 25.7 (2019), pp. 796–797. ISSN: 1868-6249. DOI: 10.1007/s12268-019-1092-0. URL: https://doi.org/10.1007/s12268-019-1092-0

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